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Table

3. Categories of Hazardous Materials, Substances, and Wastes

3.1 Categories of Hazardous Materials

There are three LLNL categories of hazardous materials, substances, and wastes in the Onsite Hazardous Materials Packaging and Transportation (HMPT) Safety Program.

Category 1

Category 1 Hazardous Materials are "controlled materials" that also fit the definition for hazardous materials given in 49 CFR 171.8 (e.g., hazardous classified material, classified waste, non-waste quantities of fissionable and other radioactive materials, accountable nuclear materials, explosives, and nuclear components and special assemblies).

Category 2

Category 2 Hazardous Materials are unclassified hazardous or radioactive materials, substances, and wastes of negligible economic value, i.e., hazardous, explosive, and radioactive wastes.

Category 3

Category 3 Hazardous Materials are all hazardous material and substances other than those identified in Categories 1 and 2.

3.2 Explosives Storage Compatibility/Handling Control System

LLNL uses an explosives storage compatibility/ handling control (SC/HC) system to group explosives according to their form or composition, ease of ignition, and susceptibility to detonation. The control system facilitates the identification of the type(s) of explosives permitted in an approved explosives work area.

Below is a description of the explosives SC/HC system.

Definition of SC/HC System

The SC/HC system utilized by the United Nations Organization (UNO) system contains storage compatibility groupings (SCGs) and categorizes explosives by their form or composition, ease of ignition, or ease of detonation.

UNO Storage Compatibility Grouping

The UNO storage compatibility grouping is the handling control system used to control the group of explosives permitted in an approved explosives work area. Different types of explosives may be transported together or stored in the same storage magazine if they are compatible. The Storage Compatibility Mixing Chart in **Table 3-1** is used for determining compatibility and group mixing. The definition for each SC/HC group and examples of each are given below:

SC/HC Group A

SC/HC Group A consists of bulk initiating explosives that have the necessary sensitivity to friction, heat, or percussion (shock) to make them suitable for use as initiating elements in an explosive train. At LLNL, for purpose of procedural controls, a distinction is made between primary initiating explosives and non-primary initiating explosives. Examples of primary initiating explosives are lead azide, lead styphnate, mercury fulminate, and tetracene. Non-primary initiating explosives are dry forms of tetranitro tetrazacycloctane (HMX), trinitro triazacyclohexane (RDX) and pentaerythritol tetranitrate (PETN).

SC/HC Group B

SC/HC Group B consists of detonators and similar initiating devices that do not contain two or more independent safety features. Also, the group includes items containing initiating explosives that are designed to initiate or continue the functioning of an explosives train. Examples are detonators (exploding-bridgewire [EBW] and slapper detonators are excluded from this group only for storage and onsite transportation), blasting caps, small arms primers, and fuses.

SC/HC Group C

SC/HC Group C consists of bulk propellants, propelling charges, devices containing propellant with or without their own means of initiation. Examples are single-, double-, and triple-base propellants, composite propellants, rocket motors (solid propellant), and ammunition with inert projectiles.

SC/HC Group D

SC/HC Group D consists of explosives and devices that contain explosives without their own means of initiation. This groups includes explosives and ammunition that can be expected to explode or detonate when any given item or component thereof is initiated except for devices containing initiating explosives with independent safety features. Examples are wet HMX, plastic bonded explosves (explosives formulated with a desensitizing plastic binder), trinitrotoluene (TNT), and black powder.

Note: For storage and onsite transportation only, Group D includes EBW and slapper detonators plus assemblies, candle pads, and mirror pads with either EBW or slapper detonators installed.

SC/HC Group E

SC/HC Group E are explosives devices without their own means of initiation and containing or with propelling charge (other than one containing a flammable or hypergolic liquid). Examples are artillery ammuntion, rockets, and guided missiles.

SC/HC Group F

SC/HC Group F are explosives devices with their own means of initiation and with or without propelling charge. Examples are grenades, sounding devices, and similar items having an in-line explosive train in the initiator.

SC/HC Group G

SC/HC Group G consists of pyrotechnic materials and those devices containing pyrotechnic materials. Examples are devices that when functioning result in an incendiary, illumination, lachrymatory, smoke, or sound effect.

SC/HC Group L

SC/HC Group L are explosives or ammunition not included in the other SC/HC groups. This group includes explosives or ammunition having characteristics which do not permit storage with other similar or dissimilar materials. Examples are damaged or suspect explosives devices or containers, explosives that have undergone severe testing, fuel/air explosive devices, and water-activated devices. Also included are experimental explosives, explosives of temporary interest, newly synthesized compounds, new mixtures, and salvaged explosives until they have been established to be compatible with the original materials. Types presenting similar hazards may be stored together.

Note: Explosive residues from tests and partially reactivated explosives are also treated as Group L explosives.

SC/HC Group S

SC/HC Group S consists of explosives, explosives devices, or ammunition presenting no significant hazard. Explosives or ammunition, so designed or packed that, when in storage, all hazardous explosives effects are confined and self-contained within the time or package. An incident may destroy all items in a single pack, but must not be communicated to other packs. Examples are thermal batteries, cable cutters, explosive actuators, and other ammuntion items packaged to meet the criteria of this group.

Note: Explosves devices that are packed to meet this group requirements revert to their higher Hazard Class/Division and Compatibility Group when they are removed from the DOT-approved shipping container.

Storage Compatibility

Each explosive material and explosive device is to be assigned to an appropriate Hazard Class/Division and SC/HC group prior to being stored, handled, or transported. Different types of explosives may be stored together in the same magazine if they are compatible. The storage compatibility mixing chart (**Table 3-1**) is used for determining compatibility and group mixing. The possibility of chemical interaction should always be considered when placing any explosves in common storage.

Combined Storage of SC/HC Groups

Items from SC/HC Groups B, C, D, E, F, G, and S may be combined in storage if the net quantity of explosives in storage does not exceed 454.4 kg (1,000 lb) and if authorized by the Facility Safety Procedure (FSP) or Operational Safety Procedure (OSP) governing the magazine. Combining Groups B, C, E, F, G, and S in a net quantity greater than 1,000 lb is prohibited. Mixing SC/HC groups in storage requires the explosives to be packaged in approved containers with lids tightly secured.

For More Information

LLNL's explosives safety program is described in greater detail in the *LLNL Health and Safety Manual,* Chapter 24, "Explosives," and Chapter 24 supplements.

Table 3-1. Storage compatibility mixing chart

Groups	A	B	C	D	E	F	G	L	S
A	x	z							
B	z	x	z	z	z	z	z		x
C		z	x	x	x	z	z		x
D		z	x	x	x	z	z		x
E		z	x	x	x	z	z		x
F		z	z	z	z	x	z		x
G		z	z	z	z	z	x		x
L								x	
S		x	x	x	x	x	x		x

Notes:
1. An "x" indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted according to the following paragraphs:
2. A "z" indicates that when warranted by operational considerations or magazine unavailability and when safety is not sacrificed, these groups may be combined in storage when approved by an OSP and stored in DOT-approved containers. Further, the magazine is limited to 1,000-lb net explosives weight (NEW).
3. No mark in a block indicates that combined storage is not permitted.

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